Note: thanks to Wanda Dann and Steve Cooper for slide ideas
Announcements

• Read Chapter 5 Sec 2 for next Tuesday
• New groups today
• Assignment 5 out
What we will do today

• Lecture on Chap 5, Sec 1
  – Interactive Programming

• Classwork
Control of Flow

• Control of flow – how the sequence of actions in a program is controlled
  – What action happens first, second, third, …. 

• In movie-style programs (Chaps 1-4) the sequence of actions is determined by the programmer
  – Creating a storyboard design
  – Writing program methods to carry out the designed sequence
Interactive Animations

• In interactive programs, the sequence of actions is determined at runtime, when the user provides input
  – Clicks the mouse
  – Presses a key on the keyboard
• Other sources of input are possible
Interactive Games

• In a video game where the user is guiding a spaceship, the sequence of actions …
  – Depends on what direction the user guides the ship
  – How fast the user presses the controls
• Each time the program runs, user input may cause a different sequence of actions
• Control of flow is “in the hands of the user”
Events

• Each time the user provides some sort of input, an event is generated
  – An event is something that happens

From Appendix

When spacebar pressed, Bee turns around
Event Handlers

- An event may
  - Trigger a response, or
  - Move objects into positions that create some condition (e.g. a collision) that triggers a response
- A method is called to carry out the response. The type of method is called an event handler.
- When an event is linked to an event handler, a behavior is created.
How does this effect your program?

- Our goal is to write interactive programs.
- The approach is the same as before, but the difference is now must be concerned with behaviors.
  - input from the user (events)
  - How objects respond to an event (event handler methods)
Example

• Build an air show flight simulator. The pilot uses the biplane controls to perform acrobatic stunts.
Problem

• The idea in a flight simulator
  – Allow user to control the flight path

• Problem
  – How do we write program code to provide a guidance system that allows the user to be the pilot?
Solution

• Use keyboard input
  – Up-arrow key to move the biplane forward
  – Spacebar to make the biplane do a barrel roll
  – Note: other keys could be chosen

• Write event handler methods that respond to each key press
Storyboards

• Since two keys are used, two events are possible – so two storyboards are needed

**Event**: Spacebar press

**Response**:
Do together
- roll biplane a full revolution
- play biplane engine sound

**Event**: Up arrow press

**Response**:
Do together
- move biplane forward
- play biplane engine sound

• Each storyboard outlines and event handler
  – Responds to a particular event
Demo

• A demo of building the biplane simulation
  – flyForward
  – barrel
biplane.flyForward

- Do not modify the length of the sound
  - use “as is”
- Coordinate duration of *move* and *play sound*
  - Match duration of move to duration of sound
Events Editor - Linking

• Each event handler method must be linked to an event

1) Select “create new event” Then choose the type of event

2) A template linking is created
Events Editor – Linking (cont)

3) Select type of key for event

4) Select event handler method

Final result:
Testing

- Test event handler methods as they are developed
- Write a method and test it, write a method and test it, and so on
  - incremental development
Classwork today

- Create 4 buttons and a spider robot
- Press green button and spider moves forward
- Press red button and spider moves backward
- Other two buttons?